Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

I think, than to use Duhamel's theorem, and as logical. It should be added, however, that in the treatment of multiple integrals the author is not so successful, and is forced to disregard small quantities of higher order without explanation.

The American reader is impressed with the amount of geometry that is given. The chapters on curve tracing, envelopes, evolutes, roulettes, and graphics and nomography have much in them that is not included in our introductory texts. As there are no counterbalancing omissions, we would find it necessary to lengthen our course to include it all. The book furnishes an excellent reference work for this material. The last chapter, on "Graphics, nomography," gives in ten pages a good idea of the possibilities of the subject, and should, as the author states, "enable the reader to follow the complicated nomograms which are largely used in France and other countries."

The book as a whole is very carefully written, with surprisingly few errors. An occasional slip is however noted. For example, on page 49, we read that "if $f(x)$ is increasing as x passes through $x = a$, $f'(a)$ is positive," overlooking the possibility of $f'(a) = 0$. Other errors were noted, but are of no great importance.

E. J. MOULTON.

Periodic Orbits. By F. R. MOULTON in collaboration with DANIEL BUCHANAN, THOMAS BUCK, F. L. GRIFFIN, W. R. LONGLEY, W. D. MACMILLAN. (Publication no. 161) Carnegie Institution of Washington, 1920. 4to. 14 + 524 pp.

Quotation from the Introduction: "The problem of three bodies received a great impetus in 1878, when Hill published his celebrated researches upon the lunar theory. His investigations were carried out with practical objects in mind, and comparatively little attention was given to the underlying logic of the processes which he invented. For example, the legitimacy of the use of infinite determinants was assumed, the validity of the solution of infinite systems of non-linear equations was not questioned, and the conditions for the convergence of the infinite series which he used were stated to be quite unknown. These deficiencies in the logic of his work do not detract from the brilliancy and value of his ideas, and his skill in carrying them out excites only the highest admiration.

"The work of Hill was followed in the early nineties by the epoch-making researches of Poincaré, which were published in detail in his *Les Méthodes Nouvelles de la Mécanique Céleste.* Poincaré brought to bear on the problem all the resources of modern analysis. The new methods of treating the difficult problem of three bodies which he invented (*sic*) were so numerous and powerful as to be positively bewildering. They opened so many new fields that a generation will be required for their complete exploration. On the one hand, the results were in the direction of purely theoretical considerations, in which Birkhoff has recently made noteworthy extensions; on the other hand, they foreshadowed somewhat dimly methods which will doubtless be of great importance in practical applications in celestial mechanics. The researches of Poincaré are scarcely less revolutionary in character than were those of Newton when he discovered the law of gravitation and laid the foundations of celestial mechanics.

"In 1896 Sir George Darwin published an extensive paper on the problem of three bodies in *Acta Mathematica.* In mathematical spirit it was similar to the work of Hill; indeed, the methods used were essentially those of Hill, but the problem treated was considerably different. For a ratio of the finite masses of ten to one, Darwin undertook to discover by numerical processes all the periodic orbits of certain types and to follow their changes with varying values of the Jacobian constant of integration. This program was excellently carried out at the cost of a great amount of labor. It gave specific numerical results for many orbits in a particular example.

"The investigations contained in this volume were begun in 1900 and, with the exception of the last chapter, they were completed by 1912. Those not made by myself were carried out by students who made their doctorates under my direction.

"The following chapters have been heretofore published in substance:"

I. Sections III and IV. *American Journal of Mathematics*, vol. 33 (1911).
II. *Astronomical Journal*, vol. 25 (1907).
III. *Rendiconti Matematico di Palermo*, vol. 32 (1911).
IV. *Transactions of the American Mathematical Society*, vol. 11 (1910).
VII. *Mathematische Annalen*, vol. 73 (1913).
VIII. *Annals of Mathematics*, second series, vol. 12 (1910).
XI–XIV. *Transactions of the American Mathematical Society*, vols. 7 (1906), 13 (1912), 8 (1907), and 9 (1908) respectively.
XV. *Proceedings of the London Mathematical Society*, series 2, vol. 2 (1912).

"The investigations and computations contained in the last chapter were completed in 1917. . . . Most of the computations on which many of the results of the last chapter are based were made by Dr. W. L. Hart and Dr. I. A. Barnett. Without assistance of such a high order the laborious computations could not have been carried out."

Contents: I: "Certain theorems on implicit functions and differential equations" (Moulton and Mac Millan), 1–54; II: "Elliptic motion," 55–66; III: "The spherical pendulum," 67–98; IV: "Periodic orbits about an oblate spheroid" (MacMillan), 99–150; V: "Oscillating satellites about the straight-line equilibrium points (first method)," 151–198; VI: "Oscillating satellites (second method)," 199–216; VII: "Oscillating satellites when the finite masses describe elliptic orbits," 217–284; VIII: "The straight-line solutions of the problem of n bodies," 285–298; IX: "Oscillating satellites near the Lagrangian equilateral triangle points" (Buck), 299–324; X: "Isosceles-triangle solutions of the problem of three bodies" (Buchanan), 325–356; XI: "Periodic orbits of infinitesimal satellites and inferior planets," 357–378; XII: "Periodic orbits of superior planets," 379–388; XIII: "A class of periodic orbits of a particle subject to the attraction of n spheres having prescribed motion" (Longley), 389–424; XIV: "Certain periodic orbits of k finite bodies revolving about a relatively large central mass" (Griffin), 425–456; XV: "Closed orbits of ejection and related periodic orbits," 457–484; XVI: "Synthesis of periodic orbits in the restricted problem of three bodies," 485–524.

Elementary Functions and Applications. By A. S. GALE and C. W. WATKEYS. New York, Henry Holt and Company, 1920. 12mo. 20 + 436 pages. Price $2.60.

From the preface: "This book presents a coherent year's work in mathematics for college freshmen, consisting of a study of the elementary functions, algebraic and transcendental, and their applications to problems arising in various fields of knowledge. The treatment is confined to functions of one variable, with incidental exceptions, and complex values of the independent and dependent variables are excluded. The subject matter includes the essentials of plane trigonometry and topics from advanced algebra, analytic geometry, and calculus.

"The text is the result of experiments beginning in 1907–8. It has been used in the classroom since 1913–14, and each year extensive revisions have been made. Hence the content of the course, the order of topics, and the manner of presentation are based upon the experience of several years.

"The unity of the course is gained by an explicit analysis of the functions studied, which enables the student to comprehend the purpose of the course as a whole and the nature of the investigation of properties of functions of a given type. This analysis consists of three parts:

"First. Relations between a given function and its graph. . . . Most of these relations are considered in the first chapter so that at the start the student is made aware of a number of questions which will be investigated in studying a particular type of functions.

"Second. Relations between pairs of functions and their graphs. . . . These geometric transformations are introduced in connection with simple algebraic functions so that they are familiar tools by the time they are needed for the study of transcendental functions.

"Third. Analogous properties of functions which have no immediate graphical interpretation. Several properties of x^n are grouped together . . . in order to indicate further questions which should be investigated in studying transcendental functions.

"Emphasis is also placed on characteristic properties which distinguish one class of functions from another."